Christian E. Mammen, Oregon Bar No. 181778
chris.mammen@wbd-us.com
Carrie Richey (admitted *pro hac vice*)
carrie.richey@wbd-us.com
WOMBLE BOND DICKINSON (US) LLP
1841 Page Mill Road, Suite 200
Palo Alto, CA 94304
Telephone: (408) 341-3067

John D. Wooten IV (admitted *pro hac vice*)
jd.wooten@wbd-us.com
WOMBLE BOND DICKINSON (US) LLP
300 North Greene Street, Suite 1900
Greensboro, NC 27401
Telephone: (336) 574-8090

Attorneys for Plaintiff PASCO Scientific

UNITED STATES DISTRICT COURT

DISTRICT OF OREGON

PORTLAND DIVISION

PASCO SCIENTIFIC, Plaintiff, v. VERNIER SOFTWARE & TECHNOLOGY LLC, Defendant.	Case No.: 3:21-cv-01523-IM PLAINTIFF PASCO SCIENTIFIC'S OPPOSITION TO DEFENDANT VERNIER SOFTWARE & TECHNOLOGY LLC'S RULE 12(b)(6) MOTION TO DISMISS FOR FAILURE TO STATE A CLAIM REQUEST FOR ORAL ARGUMENT

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I. INTRODUCTION AND SUMMARY OF ARGUMENT

Vernier's motion to dismiss PASCO's patent infringement suit on Section 101 grounds fundamentally miscasts PASCO's patents. They are not directed toward discovery of laws of nature, but rather toward equipment and methods of using that equipment to *teach* physics to high school and college students. This educational focus and limited purpose as a teaching tool is repeated throughout the common specification and the claims. By way of example, the specification explains the technical field as follows: "Embodiments of the present invention related to wireless smart devices having integrated force, position, acceleration, and rotational sensing *for science education.*" U.S. Patent No. 10,753,957 (the "'957 Patent") (D.N. 1-2) col. 1:16-19 (emphasis added). Figure 3 of both patents, shown below, illustrates an embodiment of the claimed invention.

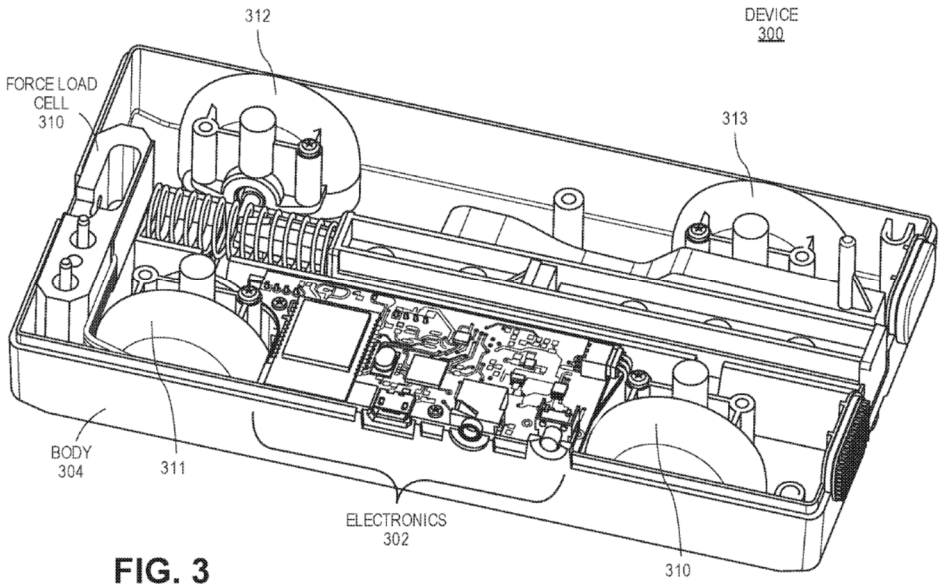

FIG. 3

The claimed invention in both patents represent advances in the technology of such equipment for science education. As the patents themselves recite, providing the sensing and processing equipment on an integrated wireless device "solves the problem of simultaneously measuring motion, force, linear acceleration and slope with high accuracy and time

synchronization," and "[w]ireless communication eliminates the adverse effect of wired connection to a moving cart." *E.g.* '957 Patent col. 2:37-64.

Thus, the claimed inventions are not directed to abstract ideas themselves, such as Newton's laws of physics, but rather to an improved type of "Wheeled Carts [to be] used in Physics lab experiments *to teach students* the principles of Newton's 2nd and 3rd law of motion." '957 Patent col. 2:37-39 (emphasis added).

For this reason alone, Vernier's motion is off-point, insofar as it extensively on the ruling in *Electric Power Group., LLC v. Alstom, S.A.*, 830 F.3d 1350 (Fed. Cir. 2016) to the effect that merely collecting, analyzing and displaying data is not patentable subject matter. Instead, this case is more clearly analogous to *Diamond v. Diehr*, 450 U.S. 175, 192 (1981), where an invention using a well-known equation in connection with curing rubber was found to be patentable, because the claims are not "an attempt to patent a mathematical formula," but rather a narrowly focused piece of equipment to be used in specific circumstances – here, teaching science.

Vernier's motion should be denied.

II. NATURE AND STAGE OF THE PLEADINGS

On October 18, 2021, PASCO filed this patent infringement suit against Vernier, alleging that Vernier's Go Direct Sensor Cart, an integrated wireless cart intended to be used in teaching high school physics, infringes various claims of U.S. Patent Nos. 10,481,173 (the "'173 Patent") (D.N. 1-1) and U.S. Patent No. 10,753,957, both titled "Wireless Smart Devices Having Integrated Force, Position, Acceleration, and Rotational Sensing for Science Education" (collectively, the "Asserted Patents"). Complaint ¶¶ 23 *et seq.*, 36 *et seq.* (D.N. 1). The Complaint makes abundantly clear that the Asserted Patents and accused product are in the limited field of science education. *E.g.,* Complaint ¶¶ 1, 2, 17, 18, 26, 39.

As alleged in the Complaint, Vernier's accused product is a nearly identical copy of PASCO's own patent-practicing product, the Smart Cart. Complaint ¶ 2. The Complaint alleges that at least claim 1 of each of the Asserted Patents is infringed. Complaint ¶¶ 24-29, 37-42. Additionally, illustrative infringement claim charts attached to the Complaint provide detailed infringement allegations for claims 1, 2, 8, 9, 15 and 16 of the '173 Patent, and claims 1-8, 10-13,

and 15-22 of the '957 Patent. *See also* Complaint Exhs. D, E (further detail and illustrative photos of the Vernier Go Direct Sensor Cart).

On December 20, 2021, Vernier filed a Rule 12(b)(6) Motion to Dismiss ("Motion"), arguing that all claims of the Asserted Patents are directed to patent-ineligible subject matter under 35 U.S.C. § 101. D.N. 20. PASCO opposes the Motion.

III. FACTUAL BACKGROUND

A. The Asserted Patents Provide Innovative Solutions to Concrete Problems in Science Education

The Asserted Patents are directed to systems and methods that use electronics-packed dynamic cart systems to teach physics principles to students.

As detailed in the specification and the claims, the Asserted Patents are directed to science education: "Science educators present learning material such as science experiments or laboratories with wheeled carts to teach students the [principles] of Newton's 2nd and 3rd laws of motion." '173 Patent col. 1:14-17.

Within the field of science education, the Asserted Patents represent advances over the prior art. As the specification explains, prior to the invention of the Asserted Patents, "it [was] necessary to either use external position and force sensors or a combination of an internal position sensor and an external force sensor to measure Cart dynamics in lab experiments." '173 Patent col. 2:32-36. Because this limitation in the prior art, cart acceleration "was inferred by calculating the second derivative of position, causing loss of accuracy." *Id.* at 2:36-37. The prior art also required the use of a grooved track "to ensure physical alignment of the cart with an external force sensor." *Id.* at 2:38-41. Additionally, "no practical means existed to measure slope of the cart in movement." *Id.* at 2:38-41. If teachers and students wished to add additional accessories to expand the possible uses of the prior art devices, those accessories required "manual control which compromise experimental data accuracy." *Id.* at 2:41-44. Additionally, having a wired connection to a moving cart also adversely affected the accuracy of experiments. *Id.* at 2:50-52.

The claimed invention of the Asserted Patents solves those problems. "All sensors (e.g., position, force, acceleration) are physically integrated into a wireless smart device (e.g., cart,

levitating device, etc.) and wireless communication, battery powered device, and no wires are used during a science experiment for demonstrating Newton's laws of motion." *Id.* at 2:9-14. Further, "[a]ll sensor measurements are time synchronized by a central microprocessor and then transmitted over a Bluetooth wireless link to an external computer for recording, analysis and display." This allows the cart to directly measure acceleration "inside the Cart rather than inferred through calculation of the second derivative of position," thus yielding greater accuracy of the measurements in the classroom experiments. *Id.* at 2:52-54. As the specification recites, wireless communications such as Bluetooth "eliminates the adverse effect of wired connection to a moving cart." *Id.* at 2:48-52. Furthermore, slope can actually be measured during a classroom science experiment within the cart through the use of a gyroscope, something that was not previously possible using any prior art devices. *Id.* at 2:54-55. Additionally, the smart cart ***removes*** the need for certain generic hardware as compared to the prior art. *Id.* at 2:14-16 ("no external interface is needed for communications between the integrated wireless device and a computer or another wireless device").

Claim 1 of the '173 Patent and claim 1 of the '957 Patent claim aspects of the invention described in the specification. Claim 1 of the '173 Patent requires "an integrated wireless device" to be used "during a science experiment" that is capable of measuring its own dynamic properties as a way to teach science to students. Claim 1 requires (1) an "accelerometer" integrated into the device "to generate acceleration data based on detecting a current rate of acceleration of the integrated wireless device over a period of time," (2) an integrated "shaft encoder" to "detect angular positional changes of a shaft or axle of the integrated wireless device over the period of time," and (3) an integrated "processing device communicatively coupled to the accelerometer and the shaft encoder" that "is configured to decode angular position data of the encoder into positional data over the period of time and to time synchronize the acceleration data received from the accelerometer with the positional data decoded by the at least one processing device for the science experiment over the period of time," as disclosed in the specification.

Similarly, claim 1 of the '957 Patent further requires (1) "a three-axis accelerometer to generate acceleration data in three dimensions based on detecting a current rate of acceleration of the integrated wireless device over a period of time," (2) "an optical encoder to generate encoder signals in response to angular positional changes of an encoder wheel caused by movement of the integrated wireless device over the period of time," and (3) an integrated "processing device communicatively coupled to the accelerometer and the shaft encoder" that "is configured to decode angular position data of the encoder into positional data over the period of time and to time synchronize the acceleration data received from the accelerometer with the positional data decoded by the at least one processing device for the science experiment over the period of time." This solves the problem of using external sensors that requires calculating the second derivative of position and using a grooved track because there is no need to align the cart with external force sensor, thus, improving accuracy, *id*. at 2:36-41.

The dependent claims add additional, inventive features to the smart cart, including the specific placement of sensors relative to one another. For example, in the '173 Patent claim 2 adds that the "shaft encoder comprises an optical shaft encoder that is positioned in proximity to the shaft or axle." Claim 3 depends from claim 2 and adds "a gyroscope that is physically aligned with the accelerometer." *See also* '957 Patent claim 9. This combination is used to measure the slope of the moving cart. '173 Patent col. 2:66-3:1. Prior to the '173 Patent, "[n]o practical means existed to measure slope of the cart in movement." *Id*. at 2:39-41. Claim 4 depends from claim 3 and further adds "a force load cell coupled to the at least one processing device." Claim 5 depends from claim 4 and further adds "processing device is further configured to time synchronize acceleration data received from the accelerometer, rotational data of the gyroscope, positional data, and force data of the force load cell over the period of time." Claim 6 depends from claim 5 and further adds "a radio frequency (RF) communication device." Claim 7 depends from claim 6 and further adds a "processing device of the integrated wireless device determines acceleration data received from the accelerometer, rotational data of the gyroscope, positional data, and force data

without any external sensors and without any wired connections to external components." Dependent claims 9 through 15 cover similar limitations.

In the '957 Patent, dependent claim 2 adds an accessory port and claim 3 adds a USB-connectable rechargeable battery. Claim 4 adds that "a force sensor coupled to the at least one processing device, the force sensor to generate force data indicative of applied forces or impact forces experienced by the integrated wireless device over the period of time" and a "processing device is further configured to time synchronize acceleration data generated by the three-axis accelerometer, positional data, and force data generated by the force load cell over the period of time." Claim 5 adds that the optical reader is "positioned in proximity to at least one wheel of the integrated wireless device." Claim 7 adds the limitation of "receiv[ing] acceleration data from the accelerometer and encoder signals from the optical encoder without any external sensors and without any wired connections to external components." Claim 8 further adds the limitation of an "processing device configured to process the encoder signals generated by the optical encoder into positional data over the period of time comprises the processor configured to decode encoded signals generated by an encoder of the optical encoder device into the positional data over the period of time." Claim 9 adds "a gyroscope that is physically aligned with the three-axis accelerometer … the at least one processing device is further configured to time synchronize acceleration data generated by the three-axis accelerometer, rotational data generated by the gyroscope, and positional data over the period of time." Dependent claims 11-19 and 21-23 cover similar limitations.

In sum, the Asserted Patents describe a specific dynamic cart system that provides improvements on prior art systems used in teaching dynamics to students, and the claims therein specifically relate to the identified improvements.

B. Vernier Obtained Its Own Patent Directed to "Cart movement detection system for a dynamics track"

As detailed in the Complaint, in 2014, Vernier applied for a patent directed to a "cart movement detection system for a dynamics track." Complaint ¶ 13.

The specification provides that "[d]ynamics tracks are used in physics education to investigate concepts in kinematics and dynamics, including Newton's laws. To measure the position and motion of a cart on such a track, various methods can be used including marking the motion on a ticker tape or analyzing the motion of the cart when passed through a photogate or pair of photogates." U.S. Patent No. 9,488,503 ("'503 Patent") at 1:19-21. Claim 1 requires a 1) cart, 2) a track, 3) a sensor on the cart, 4) an encoder scale on the track, and 5) an external receiver to receive data and determine a direction of the increment of movement of the cart. *Id*. claim 1.[1]

Vernier's system described in the specification represents the prior art systems detailed in the Asserted Patents' background that required external components and a grooved track for determining movement of the cart. The Asserted Patents provide improvements over this prior art. Vernier allowed its patent to expire for failure to pay fees. *See* Complaint ¶ 13.

C. Allegations in the Complaint

The Complaint includes the following material allegations.

In 2016, PASCO launched its "Smart Cart Demonstration Kit," the latest evolution of its original Aluminum Dynamics Cart, introduced in 1992, now with built-in sensors and Bluetooth® technology for conducting science experiments to study kinematics and dynamics. Based on the innovative technology incorporated in the Smart Cart, in January 2016, PASCO filed the patent application that led to the issuance of the '173 and '957 Patents. In 2018, and in the face of its own failed attempts to innovate, Vernier released its infringing "Go Direct® Sensor Cart"—a copycat of PASCO's product. Not only is Vernier's Go Direct® Sensor Cart a near-identical product to PASCO's Smart Cart, Vernier went so far as to copy the tracks on which the carts can be used. Complaint ¶ 2.

[1] PASCO asks this Court to take judicial notice of Vernier's patent. *See, e.g., Adasa Inc. v. Avery Dennison Corp*., No. 6:17-cv-01685-MK, 2020 WL 2083966, at *2 (D. Or. Apr. 30, 2020) ("The court must take judicial notice if a party requests it and the court is supplied with the necessary information. Fed. R. Evid. 201(c)(2). Courts may take judicial notice of undisputed matters of public record. *Lee v. City of Los Angeles*, 250 F.3d 668, 689 (9th Cir. 2001). Because these exhibits are available on the United States Patent and Trademark Office website, the Court grants Defendant's request for judicial notice.") (internal quotations omitted).

In 2016, PASCO released its Wireless Smart Cart ("Smart Cart")—low-friction dynamics cart with onboard wireless sensors that measure force, position, velocity, three degrees of freedom in acceleration, and rotational motion. The Smart Cart is capable of connecting wirelessly to a computer or tablet via Bluetooth®, or it can connect to a computer or charger via a micro universal serial bus ("USB") cable. The Smart Cart is packaged for users with a magnetic bumper, force hook, rubber bumper, and a USB charging cable. PASCO filed its application for the '173 Patent on January 5, 2016, and it issued on November 19, 2019. PASCO filed its application for the '957 Patent on November 19, 2019, as a continuation of the same application which is now the '173 Patent, and the '957 Patent issued on August 25, 2020. Complaint ¶ 14.

Upon information and belief, in early 2018, Vernier announced the release of a Go Direct® Sensor Cart, which is a copy of PASCO's Smart Cart, in order to "freeze the market" while it continued to refine its copycat design. Upon information and belief, in late 2018, Vernier actually released Go Direct® Sensor Cart, with the same look, feel, function and capabilities as PASCO's:

	
Pasco's Smart Cart	Vernier's Go Direct® Sensor Cart

Complaint ¶ 15.

According to Vernier's Go Direct® Sensor Cart User Manual (the "User Manual"), the Go Direct® Sensor Cart is an educational tool which "can be used for hands-on kinematics and dynamics demonstrations but can also be used as a force or acceleration sensor." Exhibit C [D.N. 1-3], at 1. The Go Direct® Sensor Cart can be connected wirelessly via Bluetooth to a mobile device or a computer. *Id.* at 2. Further, Vernier asserts that each Go Direct® Sensor Cart includes at least the following: an "encoder wheel to report position, 3-axis accelerometer to measure

independent acceleration, 50 N force sensor to measure push and pulls, Mass trays for changing total mass, Plunger for collision and impulse studies, Low friction wheels for uniform motion, [and an] Anti-roll peg." *Id.* at 1. Complaint ¶ 17.

These features allow the Go Direct® Sensor Cart to be used in educational experiments. Using the Go Direct® Sensor Cart, users can "[c]ollect position, velocity, and acceleration data as the cart rolls freely up and down an incline; [o]bserve collisions between two carts, test for the conservation of momentum, or measure energy changes during different types of collisions; [i]nvestigate the relationship between force, mass, and acceleration; [e]xamine the energies involved in simple harmonic motion; [and] measure a cart's momentum change and compare it to the impulse it receives." *Id.* The Go Direct® Sensor Cart includes an "accessory port" where various accessories may be added. *Id.* at 5. Go Direct® Sensor Cart contains a battery which is recharged via a USB type cable. *Id.* at 2-3. Complaint ¶ 18.

At least because Go Direct® Sensor Cart can collect velocity and acceleration measurements of the carts, and contains a force sensor and accelerometer for impact calculations, upon information and belief, the Go Direct® Sensor Cart includes a processor communicatively coupled with sensors used to make various calculations that provides the results to Vernier's software applications, such as Graphical Analysis™ 4. Complaint ¶ 19.

IV. LEGAL STANDARDS

A. Patent Subject-Matter Eligibility Under 35 U.S.C. § 101

Under Section 101, an invention is generally patentable if it qualifies as a "new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." 35 U.S.C. § 101. However, the Supreme Court has identified a judicially-created exception, such that "[l]aws of nature, natural phenomena, and abstract ideas are not patentable." *Mayo Collaborative Servs. v. Prometheus Labs.*, 566 U.S. 66, 70 (2012). In applying this exception, a court "must distinguish between patents that claim the building blocks of human ingenuity and those that integrate the building blocks into something more." *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208, 217 (2014). That is, "an *application* of a law of nature or

mathematical formula to a known structure or process may well be deserving of patent protection." *Diehr*, 450 U.S. at 188 (emphasis in original).

1. *Alice* Step 1

In *Alice*, the Supreme Court laid out a two-step test for patent eligibility: first, courts must "determine whether the claims at issue are directed to a patent-ineligible concept," such as abstract ideas. 573 U.S. at 218. The claims must be considered "in their entirety to ascertain whether their character as a whole is directed to excluded subject matter." *McRO, Inc. v. Bandai Namco Games Am. Inc*., 837 F.3d 1299, 1312 (Fed. Cir. 2016) (quoting *Internet Patents Corp. v. Active Network, Inc*., 790 F.3d 1343, 1346 (Fed. Cir. 2015)). Courts must "'be careful to avoid oversimplifying the claims' by looking at them generally and failing to account for the specific requirements of the claims." *McRO*, 837 F.3d at 1313 (citations omitted). *Alice* warns courts, however, to "tread carefully in construing this exclusionary principle lest it swallow all of patent law," because "[a]t some level, 'all inventions ... embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas." 573 U.S. at 217 (quoting *Mayo*, 566 U.S. at 71).

In conducting the Section 101 analysis, it is important to accurately characterize the claims, and to not oversimplify them. "[D]escribing the claims at such a high level of abstraction and untethered from the language of the claims all but ensures that the exceptions to § 101 swallow the rule." *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1337 (Fed. Cir. 2016); *see also McRO,* 837 F.3d at 1313 (a "court must be careful to avoid oversimplifying the claims by looking at them generally and failing to account for the specific requirement of the claims") (quotation omitted); *In re TLI Commc'ns LLC Patent Litig.*, 823 F.3d 607, 611 (Fed. Cir. 2016) (warning that "we must be careful to avoid oversimplifying the claims"); *Diehr*, 450 U.S. at 189 n.12 (cautioning that overgeneralizing claims, "if carried to its extreme, make[s] all inventions un-patentable because all inventions can be reduced to underlying principles of nature which, once known, make their implementation obvious"). Thus, as the Northern District of California has recently held, "If an abstract idea is applied in a non-generic environment and embodied a functional improvement, it

succeeds at step one." *Contour IP Holding, LLC v. GoPro, Inc.*, No. 3:17-cv-04738-WHO, 2021 WL 4148651, *8 (N.D. Cal. Sept. 13, 2021) (citing *Alice*, 573 U.S. at 217).

If the patent is not "directed to" a patent-ineligible concept, that is the end of the inquiry, and the patent is deemed patentable under Section 101. *E.g., Cardionet, LLC v. Infobionic, Inc.*, 955 F.3d 1358, 1371 (Fed. Cir. 2020) ("Because we conclude under *Alice* step one that the asserted claims … are not directed to an abstract idea, we do not reach *Alice* step two."); *McRO, Inc.*, 837 F.3d at 1316 (same).

2. *Alice* Step 2

Under *Alice* step two, which is reached only if the patent is "directed to" an ineligible concept, the court must conduct a further inquiry to determine whether the elements of the claim contain an "inventive concept sufficient to transform the claimed abstract idea into a patent eligible application." *Alice*, 573 U.S. at 221. This may involve the claiming of "additional features." *Id.* Step two "is satisfied when the claim limitations involve more than performance of well-understood, routine, [and] conventional activities previously known to the industry." *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1367 (Fed. Cir. 2018) (citations omitted). This step is "a search for an 'inventive concept'—*i.e.,* an element or combination of elements that is 'sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.'" *Alice*, 573 U.S. at 217, 218 (alteration in original). The *Alice* step two inquiry may involve questions of fact. *Berkheimer,* 881 F.3d at 1368, 1369.

If a court reaches *Alice* step two, patent eligibility may be resolved on a pleadings motion *only when* there are no factual allegations that prevent resolving the eligibility question as a matter of law. *Aatrix Software, Inc. v. Green Shades Software, Inc.*, 882 F.3d 1121, 1125 (Fed. Cir. 2018). Factual allegations that preclude resolution of the patent eligibility question on the pleadings include whether "the claim elements or the claimed combination are well-understood, routine, [or] conventional." *Id.* at 1128; *see also Koninklijke KPN N.V. v. Gemalto M2M GmbH*, 942 F.3d. 1143, 1152-53 (Fed. Cir. 2019). For example, the question of whether a claim element or combination of elements is well-understood, routine and conventional to a skilled artisan in the

relevant field is a question of fact, and, of course, any such fact that is pertinent to the invalidity conclusion must be proven by clear and convincing evidence. *Berkheimer*, 881 F.3d at 1368.

B. Applicable Legal Standard for Rule 12(b)(6) Motion

On consideration of a motion to dismiss for failure to state a claim pursuant to Federal Rule of Civil Procedure 12(b)(6), a court must "accept[] all factual allegations in the complaint as true and construe[] them in the light most favorable to the nonmoving party." *Yagman v. Garcetti*, 852 F.3d 859, 863 (9th Cir. 2017).

As noted above, if the Court reaches *Alice* step 2, the court may not decide a Section 101 motion at the Rule 12(b)(6) stage if it involves disputed issues of fact, including claim construction issues. *Aatrix*, 882 F.3d at 1128; *MyMail, Ltd. v. ooVoo, LLC*, 934 F.3d 1373, 1379 (Fed. Cir. 2019) ("if the parties raise a claim construction dispute at the Rule 12(c) stage, the district court must either adopt the non-moving party's constructions or resolve the dispute to whatever extent is needed to conduct the § 101 analysis").

V. ARGUMENT

A. Vernier's Proposed Use of a Representative Claim is Improper

In a further effort to obfuscate the educational use of the claimed integrated wireless carts, Vernier argues that claim 1 of the '173 patent should be deemed representative, but only because it "provides a physical implementation of the method on generic hardware of claim 15." Motion at 5. Further, Vernier argues, its selected claim should be deemed representative because "no claims appear to provide anything other than the collection, analysis, and potential later communication and display" of data. *Id.* at 13. While courts sometimes focus on a single claim as representative of all claims when considering patent eligibility under 35 U.S.C.§ 101, particularly where the parties agree on the selection of a representative claim, *see, e.g.*, *Elec. Power Grp., LLC*, 830 F.3d at 1352 (Fed. Cir. 2016); *Yu v. Apple Inc.*, 1 F.4th 1040, 1042 (Fed. Cir. 2021), PASCO disagrees that such an approach is appropriate here – particularly in view of Vernier's improper characterization and paraphrase of the asserted claims.

Vernier's characterization and paraphrase of the asserted claims elides and ignores key limitations, including that the claimed system is an "integrated wireless device" that takes measurements "during a science experiment" (all asserted claims), and moreover that the invention in several claims is, specifically, an "integrated wireless *cart*" ('173 Patent claims 8-9; '957 Patent claims 10-13) (emphasis added). Accordingly, Vernier's characterization and paraphrase runs afoul of the Federal Circuit's warning in *Enfish* not to frame the claims "at such a high level of abstraction and untethered from the language of the claims" as to make it inevitable that they fall within the exception to Section 101. *Enfish,* 822 F.3d at 1337.

In the context of the specification, "science experiment" clearly relates to educational use. *See, e.g.,* '173 Patent col. 1:14-15 ("Science educators present learning material such as science experiments or laboratories with wheeled carts …"); *id.* col. 2:30-32 ("Wheeled Carts are commonly used in Physics lab experiments to teach students the principles of Newton's 2nd and 3rd laws of motion.").[2] Moreover, while the apparatus and method claims are broadly drafted in parallel, Vernier's method-focused argument turns the importance of the claimed invention (improved smart carts for teaching science) on its head and is a transparent attempt to shoehorn its argument into the case law concerning software-implemented methods to "collect, analyze, and display data," and accompanying generic computer-implemented system-for-performing-the-method claims. Those cases, and that approach, provide the wrong analysis for the Asserted Patents. *See infra* § V.D.

Instead, the present case is closely analogous to *Diamond v. Diehr*, 450 U.S. 175 (1981). In *Diehr*, the Supreme Court confirmed the eligibility of patent claims despite the inclusion of a mathematical formula in a claimed method for molding raw, uncured rubber into cured rubber products. 450 U.S. at 177. The claimed method used the well-known Arrhenius equation to calculate the optimal cure time using, among other variables, the internal temperature of the mold. *Id*. at n.2. The invention improved upon prior art molding methods by constantly measuring the

[2] In the alternative, in the event that Vernier disagrees that "science experiment" as used in the claims is limited to science education, then there exists a claim construction dispute that requires denial of Vernier's motion. *MyMail*, 934 F.3d at 1379.

actual temperature inside the mold, recalculating the ideal cure time, and automatically opening the press when the ideal cure time equaled the actual time elapsed. *Id*. at 178–79.

In both *Alice* and *Mayo*, the Supreme Court cited *Diehr* approvingly. *Alice*, 573 U.S. at 223 ("the claims in *Diehr* were patent eligible because they improved an existing technological process"); *Mayo*, 566 U.S. at 81 ("the patentees did not 'seek to pre-empt the use of [the] equation,' but sought 'only to foreclose from others the use of that equation in conjunction with all of the other steps in their claimed process.'" (quoting *Diehr*)).

Accordingly, any *Alice* analysis on the Asserted Patents must conform with the result in *Diehr*. Indeed, under a proper analysis, Vernier's motion must fail at both *Alice* step one and step two.

B. *Alice* Step 1: The Claims of the Asserted Patents Are Not Directed to an Abstract Idea

In addition to *Diehr*, the claims here are similar the ones in *Thales Visionix* that were held to be patent-eligible. In *Thales Visionix*, the Federal Circuit held that claims directed to "systems and methods that use inertial sensors in a non-conventional manner to reduce errors in measuring the relative position and orientation of a moving object on a moving reference frame" were patent-eligible under step one of *Alice*. *Thales Visionix Inc. v. United States.*, 850 F.3d 1343, 1347-1349 (Fed. Cir. 2017). The claimed "[i]nertial sensors, such as accelerometers and gyroscopes measure the specific forces associated with changes in a sensor's position and orientation relative to a known starting position." *Id.* at 1344–45. The Court noted that "[s]uch sensors are used in a wide variety of applications" and are prone to "errors in the measurement of acceleration and angular velocity," which the asserted patent overcame. *Id*.

The Court analyzed the requirements of the representative claims:

> Claim 1, the independent system claim, requires: (1) a first inertial sensor mounted on the tracked object; (2) a second inertial sensor mounted on the moving platform; and (3) an element that uses the data from the two inertial sensors to calculate the orientation of the tracked object relative to the moving platform, as disclosed in the specification.
>
> Claim 22, the independent method claim, requires: (1) a first inertial sensor on a tracked object; (2) a second inertial sensor on the moving platform; and (3) the

> determination of orientation of the tracked object "based on" the signals from the two inertial sensors, as disclosed in the specification.

Id. at 1345-1346. The Court found these claims indistinguishable from *Diehr*. *Id*. at 1348. The Court found "the application of physics [can] create an improved technique for measuring movement of an object on a moving platform" and "a new and useful technique for using sensors to more efficiently track an object on a moving platform." *Id*. at 1349.

Like the patent in *Thales Visionix*, the Asserted Patents solve the problem of "simultaneously measuring motion, force, linear acceleration and slope with high accuracy and time synchronization from within a dynamics Cart"—a specific implementation of a solution to a problem in a particular field. '173 Patent col. 2:45-48.[3] *See Enfish*, 822 F.3d at 1335–36. The Asserted Patents enhance students' ability to "easily and accurately measure the dynamic properties of devices (e.g., bodies, carts) in motion (e.g., linear motion) including position, velocity, acceleration, slope angle, and applied or impact force" using a single device with integrated sensors and an integrated processor. '173 Patent col. 2:25-29. Additionally, the processor is specifically configured to decode the encoder angular position data into positional data over time and to synchronize the accelerometer's acceleration data with the positional data decoded over time. As the common specification of the Asserted Patents explains, the absence of this integration of components in the prior art limited accuracy, required additional interfaces and wired connections, and prevented the measurement of slope in science experiments in the classroom.

Further, the specification explains that prior to the claimed invention, conducting physics experiments required external sensors, additional components, wired connections, and additional human interfacing. The earlier dynamics carts "use[d] either external position and force sensors or a combination of an internal position sensor and an external force sensor to measure Cart dynamics in lab experiments." The cart's acceleration was "inferred by calculating the second derivative of position ... The use of a grooved track was required to ensure physical alignment of the cart with

[3] The technical solutions identified in this quotation are implemented, variously in the independent and dependent claims of the Asserted Patents. For example, slope is measured using the gyroscope claimed in '173 Patent claims 3-7 and similar claims.

an external force sensor." '173 Patent col. 2:36-39. These machine-specific problems resulted in a lack of accuracy, the necessity of using a grooved track, and the absence of slope measurements, all of which have been solved through the present invention. Vernier's abandoned '503 Patent is an exemplar of prior art systems that lack the features present in the claims.

Accepting the Complaint's allegations as true, the Asserted Patents here, like those in *Thales Visionix*, are directed to specific improvements to pre-existing equipment for use in school science experiments, which required external sensors and a grooved track to teach students the principles of Newton's 2nd and 3rd laws of motion. "The claims specify a particular configuration of inertial sensors and a particular method of using the raw data from the sensors in order to more accurately calculate the position and orientation of" the dynamic cart. *Thales Visionix*, 850 F.3d at 1349.

C. *Alice* Step 2: Alternatively, Extra Elements Are Present; Further Alternatively, Factual Questions Exist

Because the Asserted Patents are not directed to an abstract idea, the Court need not reach *Alice* step two. However, even if it does reach *Alice* step two, the record establishes that additional features are present. At *Alice* step two, courts "consider the elements of each claim both individually and as an ordered combination to determine whether the additional elements transform the nature of the claim into a patent-eligible application." *Enfish*, 822 F.3d at 1334. This second step is "a search for an 'inventive concept'—i.e., an element or combination of elements that is 'sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.'" *Id*. (alteration in original) (quoting *Mayo*, 566 U.S. at 72-73).

Here, the asserted claims are more than simply "collecting, analyzing, and communicating information." *Cf.* Motion at 1.

Foremost, the Asserted Patents' invention results in dynamic cart systems and methods for conducting science experiments that offer multiple advantages over the prior art systems for several reasons. First, it increases the accuracy with which internal sensors placed only within the cart measure the acceleration of the moving cart in three dimensional space. '173 Patent col. 2:54.

Second, the disclosed system can operate independently, without requiring other hardware, wires, or physical track to determine the orientation or position of the cart itself. *Id*. at 2:9-14, 30-41. "[T]he processing logic (e.g., at least one processing unit) of the integrated wireless device determines direct synchronous measurement of position and acceleration of the wireless device. No track is required for position measurements in contrast to prior approaches with carts." *Id*. at 6:65-7:2. Third, because the entire system is physically integrated into a single cart, science experiments are more easily conducted and cost is greatly reduced by eliminating of multiple internal and external sensors and interface electronics, setup time, and human interaction. *Id*. at 2:41-45, 52-57.

Additionally, the claim elements—individually and as a whole—include features that incorporate these inventive concepts into the claims themselves. *See supra* § III.A (describing the claims). This describes the use of the claimed technology to solve a particular problem, satisfying step two.

In *Bascom Global Internet Services, Inc. v. AT&T Mobility LLC*, the Federal Circuit reviewed claims covering "a content filter system for filtering content…" or "an ISP server for filtering content." 827 F.3d 1341, 1345–46 (Fed. Cir. 2016). At step one, the Federal Circuit found that those claims were generally directed to the abstract idea of filtering internet content. At step two, however, the Court found the patent "describes how its particular arrangement of elements is a technical improvement over prior art" which allowed the claims to be read as improving an existing technological process. *Id.* at 1350-51.

Further, as noted above, Vernier completely ignores the specific claim limitations of the integrated wireless cart, individually or as an ordered combination, enabling the claimed invention to increase accuracy. Vernier's *Alice* step 2 argument is one conclusory paragraph likening the claims to *Electric Power* without analysis. In fact, Vernier's argument completely misses the mark. It simply declares the present claims do not provide any specific data processing result or solution, and then quotes claim language from the patent in *Electric Power*. Motion at 18. As explained above, PASCO has established, as a matter of law, that its claims embody inventive concepts. And

the "composite indicator of reliability" claim language in *Electric Power* has no bearing on this case. This scant analysis cannot meet Vernier's burden to demonstrate invalidity by clear and convincing evidence. *See Microsoft Corp. v. i4i Ltd. P'ship*, 564 U.S. 91, 95 (2011).

Alternatively, at a minimum, the record establishes the existence of disputed issues of material fact concerning whether the additional features are present. *See Aatrix*, 882 F.3d at 1125 (Factual allegations that preclude resolution of the patent eligibility question on the pleadings include whether the claims (properly interpreted) are directed to abstract ideas and whether "the claim elements or the claimed combination are well-understood, routine, [or] conventional."); *Berkheimer*, 881 F.3d at 1368 ("The question of whether a claim element or combination of elements is well- understood, routine, and conventional to a skilled artisan in the relevant field is a question of fact. Any fact, such as this one, that is pertinent to the invalidity conclusion must be proven by clear and convincing evidence."), 1370 (denying summary judgment on dependent claims because "there is at least a material fact in light of the specification").

D. Vernier's Cited Cases Are Distinguishable

The additional arguments and case law Vernier relies on is equally unavailing.

Vernier cites *Electric Power* in support of its arguments at both *Alice* step one and step two. Motion at 13-18. However, *Electric Power* is off-point. In *Electric Power*, the Federal Circuit distinguished the asserted claims from the claims in *Enfish* because it found "the focus of the claims is not on such an improvement in computers as tools, but on certain independently abstract ideas that use computers as tools." 830 F.3d at 1354. The Federal Circuit observed that the claims monitor the performance of an electric power grid by collecting data in real-time and "do not go beyond requiring the collection, analysis, and display of available information in a particular field, stating those functions in general terms, without limiting them to technical means for performing the functions that are arguably an advance over conventional computer and network technology." *Id.* at 1351.

As noted above, Vernier attempts to shoehorn the present suit into the *Electric Power* ruling by impermissibly over-generalizing its paraphrase of the claims, and inverting the focus from the

claimed device in the apparatus claims to the accompanying method claims. The same is true for its other cited authorities. Vernier cites to *Smart Sys. Innovations, LLC v. Chicago Transit Auth*., 873 F.3d 1364, 1374 (Fed. Cir. 2017) for the same proposition. Motion at 9. Again, the claims in that case failed to claim any inventive concept. *Id*. at 1374 ("The Asserted Claims fail to provide an inventive concept."). Here, however, PASCO has shown its claims incorporate an inventive concept: improvements upon dynamic cart systems used in science experiments for teaching physics to students.

Likewise, the other decisions Vernier relies on are also distinguishable because they each fail to specify innovative solutions to concrete problems. *In re TLI Comm'cns, LLC Patent Litig*, 823 F.3d at 613 (claims for taking, transmitting, and organizing digital images not directed to a solution to a "technological problem" but "directed to the abstract idea of classifying and storing digital images in an organized manner"); *Smart Sys. Innovations*, 873 F.3d at 1372 (claims for observing collection, storage, and recognition of data," are not "a new type of bankcard, turnstile, or database" or "a method for processing data that improves existing technological processes."); *Intellectual Ventures I LLC v. Capital One Fin. Corp*., 850 F.3d 1332, 1340–42 (Fed. Cir. 2017) ("companies have frequently employed XML documents in routine business transactions"); *Two-Way Media Ltd. v. Comcast Cable Commc'ns, LLC*, 874 F.3d 1329, 1338 (Fed. Cir. 2017) (proposed "construction fails to indicate how the claims are directed to a scalable network architecture that itself leads to an improvement in the *functioning* of the system") (emphasis in the original); *Affinity Labs of Texas, LLC v. DIRECTV, LLC*, 838 F.3d 1253, 1258 (Fed. Cir. 2016) ("wirelessly communicating regional broadcast content to an out-of-region recipient" is abstract; "It is not tied to any particular technology and can be implemented in myriad ways ranging from the low-tech, such as by mailing copies of a local newspaper to an out-of-state subscriber, to the high-tech, such as by using satellites to disseminate broadcasts of sporting events."); *Univ. of Fla. Research Found., Inc. v. Gen. Elec. Co.*, 916 F.3d 1363, 1367 (Fed. Cir. 2019) ("patent nowhere identifies, and we cannot see in the claims, any 'specific improvement to the way computers operate.'"); *FairWarning IP, LLC v. Iatric Sys., Inc.*, 839 F.3d 1089, 1095 (Fed. Cir. 2016) ("The

claims here, in contrast, are not directed to an improvement in the way computers operate"); *Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335, 1345 (Fed. Cir. 2018) ("the claimed 'attention manager' encompasses a patent-ineligible abstract concept rather than an arguably technical improvement to display devices").

In an "Other Cases" section at the end of its brief, Vernier discusses *Yu v. Apple Inc.*, 1 F.4th 1040 (Fed. Cir. 2021), purportedly for the proposition that Section 101 is no longer limited to software and life sciences contexts, and can now be applied in the context of physical devices as well. Motion at 19. In *Yu*, the Federal Circuit held, in a 2-1 decision, that a patent on digital cameras using multiple sensors with multiple lenses was unpatentable because it was drawn to the abstract idea of taking two pictures and using one picture to enhance the other. *Yu v. Apple Inc.*, 1 F.4th 1040 (Fed. Cir. 2021).[4] However, as Judge Newman argued in dissent, *Diehr* is well-settled precedent, establishing that Section 102 (novelty), not Section 101, is the proper mechanism to analyze patentability of a claim where the components are alleged to be "well-known and conventional and perform only their basic functions." *Yu*, 1 F.4th at 1047-1048 (Newman, J., dissenting) ("A device that uses known components does not thereby become an abstract idea, and is not on that ground ineligible for access to patenting.").[5] The Northern District of California has distinguished *Yu* on the same basis as Judge Newman's dissent. In *Contour IP*, the asserted patent related to a point-of-view digital camera that included both the ability to record a high quality image data stream and also to wirelessly transmit a lower quality data image stream to a portable computing device (such as a mobile phone). 2021 WL 4148651, at *8. The district court denied GoPro's Section 101-based motion for judgment on the pleadings, holding that the innovative solution (lower-quality streaming to a smartphone) solved a concrete functional problem with

[4] *Yu* is further distinguishable because the claimed innovation described in the specification, a four-sensor, four lens arrangement, was not claimed; the claims only covered two-sensors and two lenses. By contrast here, the claims in the Asserted Patents do cover the claimed innovations.

[5] Moreover, although Vernier repeatedly asserts as much, there is nothing in the record other than Vernier's *ipse dixit* to establish that all components in the claimed inventions were all well-known and conventional. Particularly in the context of tools for science education, this, too, is potentially a fact issue requiring denial of Vernier's motion.

point-of-view cameras (users could not readily see and control what the camera was recording). *Id.* Specifically, this concrete problem and innovative solution removed Contour's patent from the generic abstraction of *Yu* and rendered it patentable subject matter at *Alice* step one. *Id. See also Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1300 (Fed. Cir. 2016) (reviewing cases, and distinguishing between ineligible claims covering "mere collection and manipulation of information" and patent-eligible claims covering "an improvement in computer functionality" and solutions to a "technology-based problem, even with conventional, generic components, combined in an unconventional manner"); *Bascom Global*, 827 F.3d at 1345-46, 1350-51 (although the patent's claims were directed to the abstract idea of filtering Internet content, the ordered combination of claim limitations became an inventive concept that transformed the abstract idea into a patent-eligible invention).

Finally, Vernier's analysis of *Thales Visionix*, Motion at 22, is made up. Vernier seems to suggest that the Court reached some sort of *Alice* step 2 finding in that case. However, in *Thales Visionix*, the Federal Circuit never reached step 2; it found the claims to be patent-eligible under step 1. *Thales Visionix*, 850 F.3d at 1349 ("Because we find the claims are not directed to an abstract idea, we need not proceed to step two…. The claims are patent eligible under 35 U.S.C. § 101.").

VI. CONCLUSION

The Asserted Patents provide an innovative solution (an integrated wireless device) to a set of concrete functional problems (shortcomings of non-integrated, wired devices for use in science experiments to teach physics). Thus, under *Diehr, Thales Visionix,* and *Contour IP*, the Asserted Patents are clearly drawn to patentable subject matter, and Vernier's motion to dismiss should be denied. Alternatively, to the extent the Court finds that allegations concerning patentable subject matter, consistent with this Opposition, have not been sufficiently stated in the Complaint, PASCO requests leave to file an amended Complaint to add such allegations.

Respectfully submitted,

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By: Christian E. Mammen
Christian E. Mammen, Oregon Bar No. 181778
Attorneys for Plaintiff PASCO Scientific